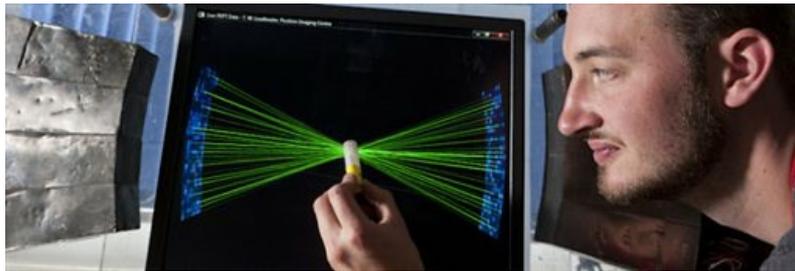


## Physics and Astronomy PhD (Theoretical Physics specialism)



### Postgraduate doctoral research degree course/programme Physics and Astronomy PhD (Theoretical Physics specialism):

The Theoretical Physics Research Group's interests span a diverse spectrum of condensed matter, ultracold-atom, and nonlinear-optical systems on length scales from the microscopic through mesoscopic to the macroscopic. From the theory of quantum critical points and the physics of nanodevices to the phase transitions of vortices in a Bose–Einstein condensate, the research has common threads of correlation,

disorder and topology.

**[Study here and find out why the University of Birmingham was awarded The Times and The Sunday Times University of the Year 2013-14](http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx)**  
**[\(<http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx>\)](http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx)**

#### Course fact file

**Type of Course:** Doctoral research

**Study Options:** Full time

**Duration:** PhD: 3.5 years full-time; MSc by research: 1 year full-time

**Start date:** Contact the School directly for further information

#### Related courses

**[Postgraduate research - School of Physics and Astronomy \(/schools/physics/postgraduate/postgraduate-research.aspx\)](/schools/physics/postgraduate/postgraduate-research.aspx)**

#### Contact

Admissions Tutor: Professor Igor Lerner

**[Contact us online \(<http://bham.hobsons.co.uk/ask.aspx?cid=1223&did=24>\)](http://bham.hobsons.co.uk/ask.aspx?cid=1223&did=24)** or at +44 (0)121 414 4574.

**[School of Physics and Astronomy \(/schools/physics/index.aspx\)](/schools/physics/index.aspx)**

#### Details

The Theoretical Physics Research Group's interests span a diverse spectrum of condensed matter, ultracold-atom, and nonlinear-optical systems on length scales from the microscopic through mesoscopic to the macroscopic. From the theory of quantum critical points and the physics of nanodevices to the phase transitions of vortices in a Bose–Einstein condensate, the research has common threads of correlation, disorder and topology.

The effects of quantum mechanics and disorder on the phases of matter form the mainstay of our research. For instance, classical physics fails completely to account for the 'phases' of electrons in a solid. In many materials quantum effects ensure that the electrons remained gaseous down to zero temperature. However, quantum mechanics also saves solid-state physics from being merely the study of the electron gas – it provides non-classical phases such as magnetism, superconductivity, etc, where the electron liquid can be highly nontrivial.

Disorder plays a distinctive role in condensed matter physics. Strongly disordered systems can form glasses (from window glasses to Coulomb ones to spin ones), whose mechanical, electronic or spin properties differ drastically from those of solids or liquids. Even a weak disorder can completely change electronic and spin transport of low-dimensional materials, leading in some cases to metal-insulator transition. At a 'mesoscopic' scale (between micro- and macro-worlds) the quantum coherence plays a decisive role and a nontrivial interplay of disorder and interaction defines transport and thermodynamic properties of solids.

The recent creation and experimental study of ultracold quantum gases of atoms is providing startling phenomena for theoretical understanding. For example, light being slowed to  $10\text{ms}^{-1}$ , or even stopped, and the creation of molecules at microKelvin temperatures present possibilities for forms of matter that are non-existent under normal conditions. These might be quantum 'condensates' of entities that are mixtures of light and particles and superfluid liquid crystals respectively.

#### Related links

**[School of Physics and Astronomy \(/schools/physics/index.aspx\)](/schools/physics/index.aspx)**

#### Fees and funding

**[Standard fees \(/postgraduate/dr-fees/tuition.aspx\)](/postgraduate/dr-fees/tuition.aspx)** apply.

Learn more about **[fees and funding \(/postgraduate/dr-fees/index.aspx\)](/postgraduate/dr-fees/index.aspx)**

#### Scholarships and studentships

We have a number of studentships supported by the UK research councils EPSRC and STFC available each year, including some CASE awards. These studentships cover the costs of tuition fees and provide a subsistence allowance for 3.5 years. They are available to UK nationals with at least an upper second-class Honours degree from a UK university, or equivalent. Preference is usually given to those holding four-year MPhys or MSci degrees.

We offer about half a dozen postgraduate teaching assistantships each year as top-ups to EPSRC and STFC studentships. There are also substantial opportunities for postgraduate demonstrators. EU nationals may be eligible for fees-only awards, which are occasionally supplemented by the School. Scholarships may be available, for more information contact the School directly or email [sfo@contacts.bham.ac.uk](mailto:sfo@contacts.bham.ac.uk) (<mailto:sfo@contacts.bham.ac.uk>)

International students can often gain funding through overseas research scholarships, Commonwealth scholarships or their home government.

## Entry requirements

Learn more about [entry requirements \(http://www.birmingham.ac.uk/students/dr/requirements\)](http://www.birmingham.ac.uk/students/dr/requirements).

### International students

We accept a range of qualifications from different countries – learn more about [international entry requirements \(http://www.birmingham.ac.uk/students/dr/requirements/international\)](http://www.birmingham.ac.uk/students/dr/requirements/international).

[Standard English language requirements \(/postgraduate/requirements-pgt/international/index.aspx\)](#) apply.

## How to apply

Learn more about [applying \(/postgraduate/requirements-dr/index.aspx\)](#)

When clicking on the Apply Now button you will be directed to an application specifically designed for the programme you wish to apply for where you will create an account with the University application system and submit your application and supporting documents online. Further information regarding how to apply online can be found on the [How to apply pages \(http://www.birmingham.ac.uk/students/courses/postgraduate/apply-pg/index.aspx\)](#)

[Apply now \(https://pga.bham.ac.uk/lpages/EPS005.htm\)](https://pga.bham.ac.uk/lpages/EPS005.htm)

[Apply now \(https://pga.bham.ac.uk/lpages/EPS005.htm\)](https://pga.bham.ac.uk/lpages/EPS005.htm)

## Related links

[Postgraduate degree courses - School of Physics and Astronomy \(/schools/physics/postgraduate/index.aspx\)](#)

## Related news and events

[Birmingham Physicists excited by hints of Higgs boson existence \(/research/impact/our/news/items/higgs-hints.aspx\)](#)

## Research interests of staff

The School of Physics and Astronomy was placed among the leading research institutions in the latest (2008) Research Assessment Exercise.

Our research portfolio is wide-ranging, and covers three principal themes: Particle and Nuclear Physics; Quantum Matter and Nanoscale Science; and Astronomy. We have over 120 academic and research staff together with 120 graduate students with around 50 technical and clerical support staff. Our annual research income is over £8 million and more than 250 research publications are produced each year.

Visit the website for the [Theoretical Physics \(http://www.theory.bham.ac.uk\)](http://www.theory.bham.ac.uk) for further information.

## Related research

- [Theoretical Physics \(http://www.theory.bham.ac.uk\)](http://www.theory.bham.ac.uk)
- [School of Physics and Astronomy research \(/research/activity/physics/index.aspx\)](#)

## Related staff

[Professor Igor Lerner \(/staff/profiles/physics/lerner-igor.aspx\)](#)

## Employability

### University Careers Network

Preparation for your career should be one of the first things you think about as you start university. Whether you have a clear idea of where your future aspirations lie or want to consider the broad range of opportunities available once you have a Birmingham degree, our Careers Network can help you achieve your goal.

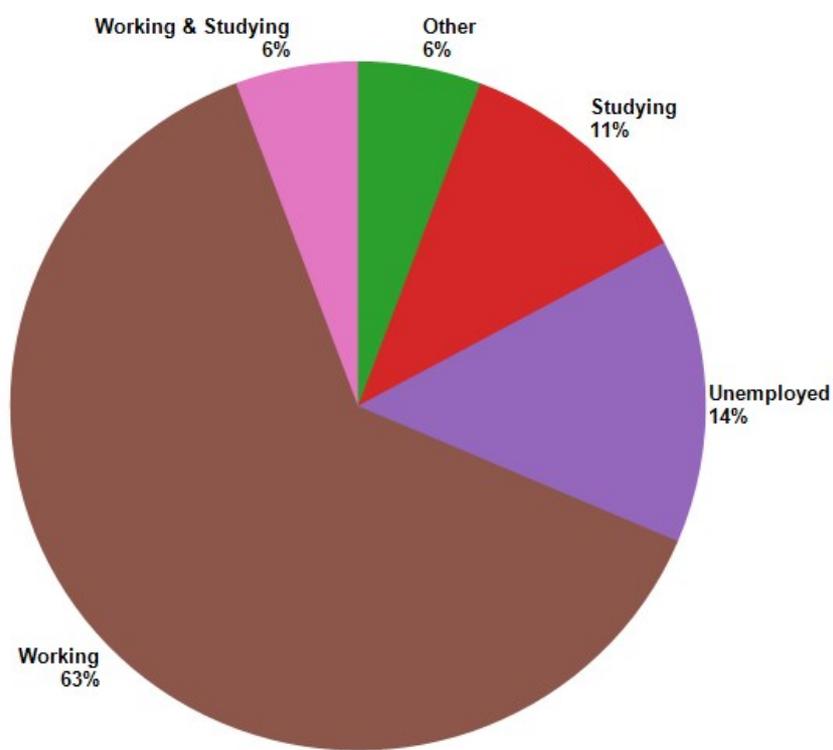
Our unique careers guidance service is tailored to your academic subject area, offering a specialised team (in each of the five academic colleges) who can give you expert advice. Our team source exclusive work experience opportunities to help you stand out amongst the competition, with mentoring, global internships and placements available to you. Once you have a career in your sights, one-to-one support with CVs and job applications will help give you the edge.

If you make the most of the [wide range of services \(https://intranet.birmingham.ac.uk/as/employability/careers/college/eps/index.aspx\)](https://intranet.birmingham.ac.uk/as/employability/careers/college/eps/index.aspx) you will be able to develop your career from the moment you arrive.

### Destinations of Leavers from Higher Education (DLHE) 2011/12 (postgraduate taught graduates)

The DLHE survey is conducted 6 months after graduation.

Examples of employers



- Siemens
- Rolls Royce PLC
- Optical Performance Centre
- KPMG
- Microsoft Ltd
- King Edwards Consortium
- J.Sainsburys PLC
- Mondrago Investigations Limited
- Self employed
- NHS

**Examples of occupations**

- Software Engineer
- Trainee Clinical Scientist
- Technology Graduate
- Secondary School Teacher - Physics
- Research Analyst
- Nuclear Manufacturing Engineer Intern
- Musician
- Recruitment Consultant
- Internet Application Engineer
- Data Analyst

**Further study - examples of courses**

- MSc Astrophysics

- MSc Computer Science
- MSc Forensic Ballistics
- MSc Medical Imagery
- MSc Nuclear Physics
- MSc Physics and Technology
- MRes Chemical Engineering
- PhD Electronic Engineering
- PhD Physical Sciences

Visit the **Careers section of the University website** (<https://intranet.birmingham.ac.uk/as/employability/careers/college/eps.aspx>) for further information.

